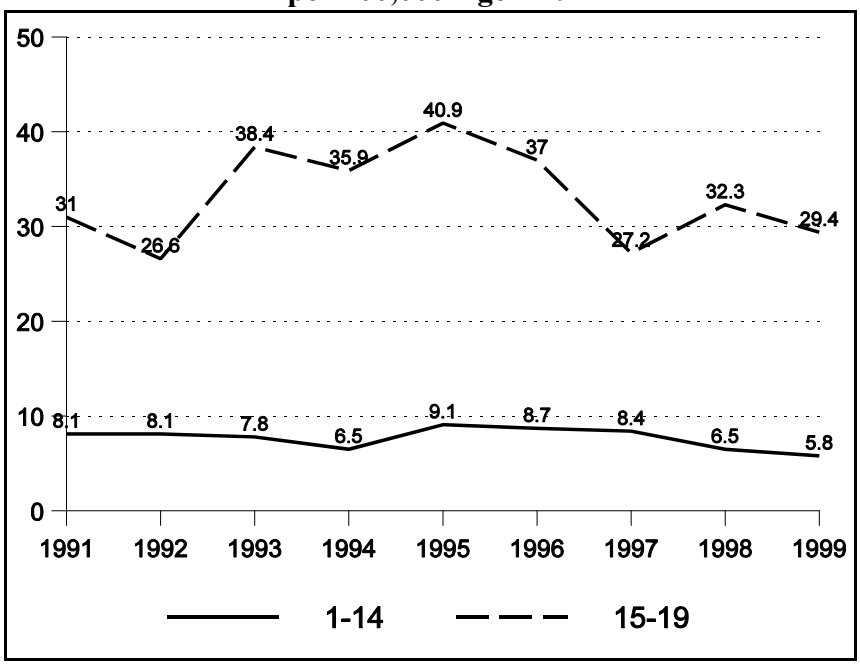
Motor Vehicle

This report is divided into three parts. Part I focuses on mortality related to motor vehicle accidents. Part II details the injuries due to motor vehicle crashes reported by the Arizona Department of Transportation. Part III focuses on morbidity related to motor vehicle accidents.

Part I. Motor Vehicle Mortality Rate[1]

In 1999, 159 children aged 1-19 died from injuries due to motor vehicle accidents. Rates were higher for adolescents than for children under age 15 (see Figure 1 below). The following pages will look at mortality for children 1-14 and then ages 15-19. There is no available motor vehicle mortality data for infants under age one or for young adults aged 20-24.

Figure 1. Motor Vehicle Mortality per 100,000 Age 1-19

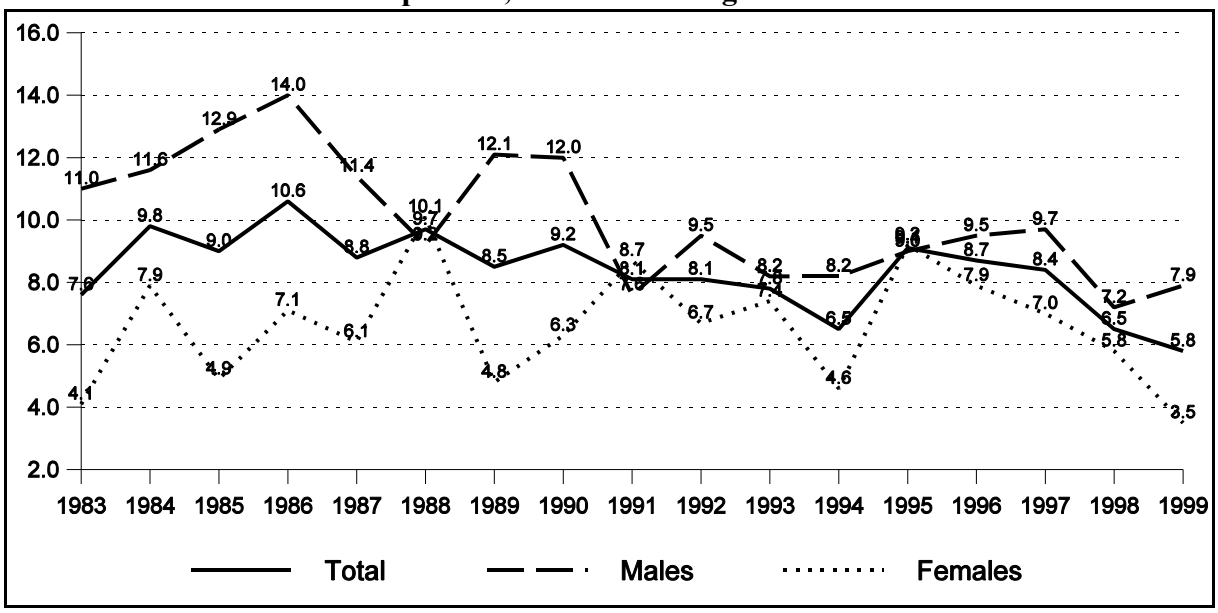


[1]Motor vehicle-related deaths are identified by ICD codes E810-E825.

3 Motor Vehicle Mortality Age 1-14

There were 59 motor vehicle-related deaths among children age 1-14 in 1999, representing a rate of **5.8 per 100,000.** Mortality rates in 1998 varied by ethnicity with American Indian, Black, and Hispanic children dying at rates which were higher than the statewide rate (18.6, 13.7 and 6.7 respectively). White non-Hispanic children had a motor-vehicle mortality rate of 2.9 per 100,000. Mortality remained higher for males than females in most years (see Figure 2).

Figure 2. Motor Vehicle Mortality per 100,000 Children Age 1-14



Motor vehicle-related deaths have remained consistently higher in the rural areas than in urban areas. Table A below shows the number of deaths attributed to motor-vehicles among children and rates per 100,000 population by gender and urban-rural location.

Table A. Motor Vehicle Mortality Age 1-14

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total Deaths	65	67	67	57	81	82	81	64	59
Rates per 100,000 Total	8.1	8.1	7.8	6.5	9.1	8.7	8.4	6.5	5.8
Male	7.6	9.5	8.2	8.2	9.0	9.5	9.7	7.2	7.9
Female	8.7	6.7	7.4	4.6	9.2	7.9	7.0	5.8	3.5
Urban	6.2	6.2	5.6	5.0	7.5	6.5	7.0	5.7	4.9
Rural	41.6	14.7	15.7	12.7	12.4	16.1	11.9	6.7	9.0

3 Motor Vehicle Mortality Age 15-19

There were 100 motor vehicle-related deaths among the 340,321 adolescents in 1999, representing a rate of **29.4 per 100,000.** The motor vehicle-related mortality rate has remained consistently higher for males than females in the 15-19 age group (see Figure 3). Motor vehicle-related deaths are consistently higher in the rural areas than in urban areas.

Table B shows the number of deaths for each year from 1991 through 1999 and rates of deaths per 100,000 adolescents age 15-19 from 1991 through 1999 by gender and urban-rural location.

Figure 3. Motor Vehicle Mortality per 100,000 Adolescents Age 15-19

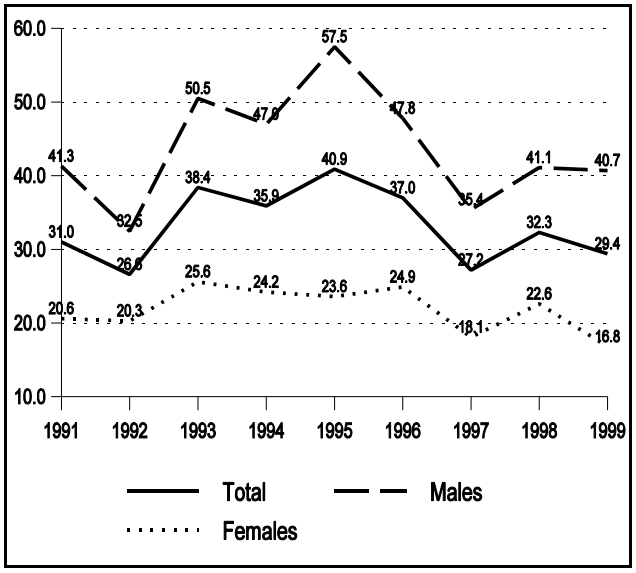


Table B. Motor Vehicle Mortality Age 15-19

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number of Deaths	83	73	98	94	114	114	86	106	100
Rate per 100,000	31.0	26.6	38.4	35.9	40.9	37.0	27.2	32.3	29.4
Male	41.3	32.5	50.5	47.0	57.5	47.8	35.4	41.1	40.7
Female	20.6	20.3	25.6	24.2	23.6	24.9	18.1	22.6	16.8
Urban	27.6	25.5	30.8	31.6	32.5	27.8	20.0	26.4	22.9
Rural	42.5	30.3	62.5	52.8	50.9	66.8	46.1	44.8	50.4

Part II. Reported Cases

In 1999, 27,833 injuries from motor vehicle crashes to children and young adults age 0-24 were reported by the Arizona Department of Transportation. Rates of injuries were much higher for adolescents and young adults than for younger children as shown in Figure 4. Table C below shows the number and rates of reported injuries due to motor vehicle crashes for males and females with five-year age groups. Statistics include all reported victims, whether or not they were Arizona residents.[2]

Figure 4. Reported Injury Rates from Motor Vehicle Crashes in 1999 per 100,000 Population within Age Subgroups

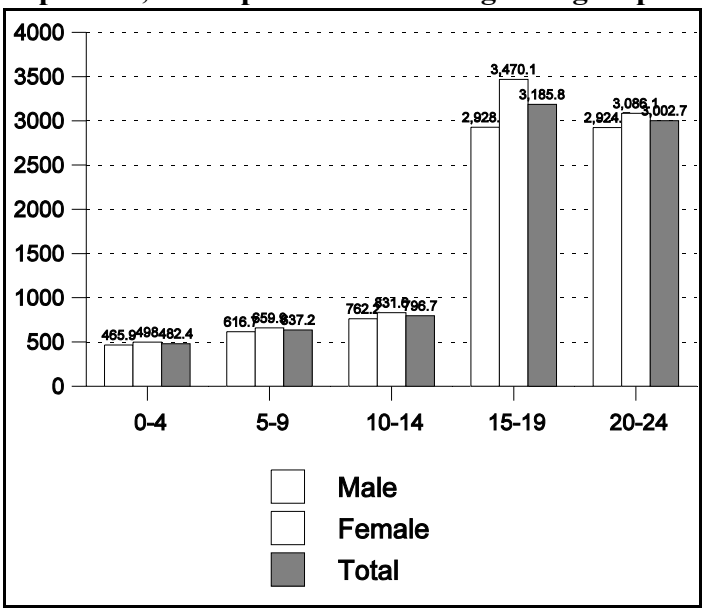


Table C. Motor Vehicle Injuries Ages 1-24 in 1999

Number of Injuries	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**Total**
Male	871	1,217	1,436	5,254	5,150	13,928
Female	885	1,181	1,407	5,583	4,828	13,884
Gender Unknown	3	0	6	5	7	21
Total	1,759	2,398	2,849	10,842	9,985	27,833
Rate of Injury	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**Total**
Male	465.9	616.7	762.2	2,928.1	2,924.7	1,500.6
Female	498.0	659.9	831.6	3,470.1	3,086.1	1,646.6
Total	482.4	637.2	796.7	3,185.8	3,002.7	1,571.3
Population	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**Total**
Male	186,940	197,334	188,398	179,432	176,089	928,193
Female	177,694	178,973	169,187	160,889	156,442	843,185
Total	364,634	376,307	357,585	340,321	332,531	1,771,378

Part III. Hospital Utilization Related to Motor Vehicle Accidents

[2]Source: Arizona Department of Transportation, Motor Vehicle Crash Facts: 1999.

3 Motor Vehicle-Related Hospital Admissions Age 1-14

There were 1,167 hospital admissions[3] among children age 1-14 in 1999, with a diagnosis code indicating a motor vehicle accident, representing a rate of **114.1 hospital admissions per 100,000** children. Twelve children died before being discharged from the hospital. Male admission rates for motor vehicle accidents have been consistently higher than female rates throughout the 1990s (see Figure 5). The average length of stay for hospital admissions related to motor vehicle accidents was 3.4 days in 1999.

Figure 5. Hospital Admissions Related to Motor Vehicle Accidents per 100,000 Children Age 1-14

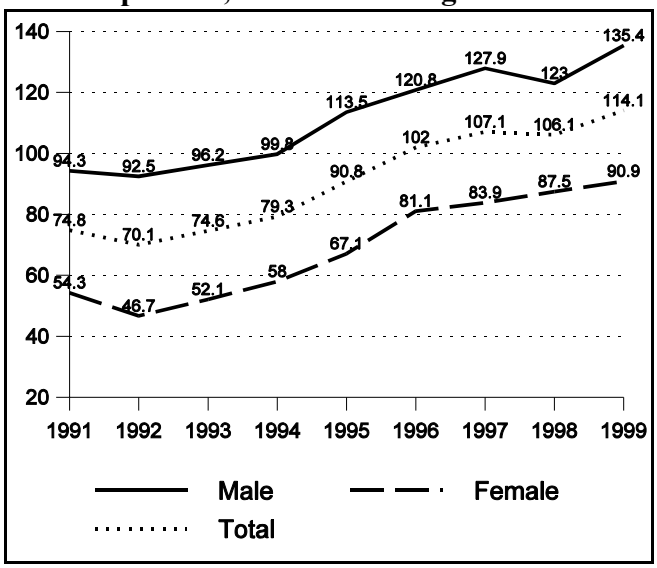
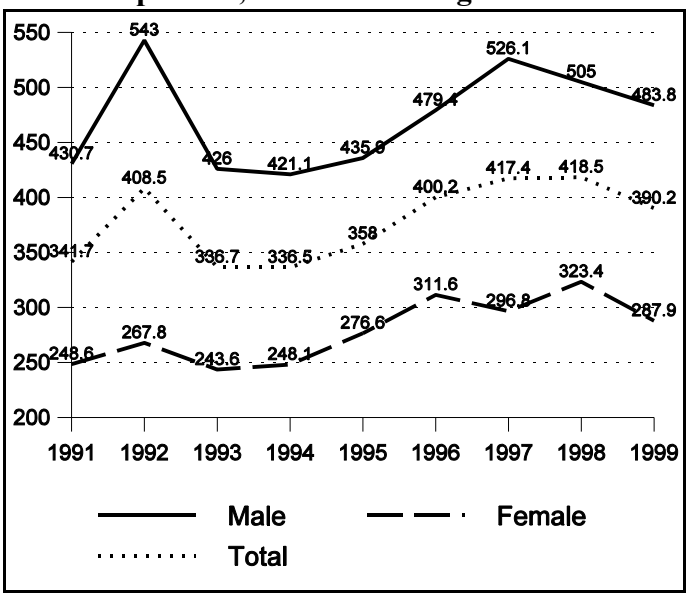


Figure 6. Hospital Days Related to Motor Vehicle Accidents per 100,000 Children Age 1-14



There were 3,990 inpatient hospital days due to motor vehicle accidents in 1999, representing a rate of 390.2 **patient days per 100,000** children. Males have had a consistently higher rate of hospital days per 100,000 population than females throughout the period reviewed (see Figure 6).

Table D on the following page is a profile of hospital utilization for children related to motor vehicle accidents from 1991 through 1999.

[3]The following ICD codes were used to identify motor-vehicle accidents: E810-E825, E846-E849, or E988.5.

Table D. Hospitalizations Related to Motor-Vehicle Accidents Age 1-14									
Admissions	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	387	389	420	449	514	601	649	634	723
Female	213	188	218	250	291	361	384	410	444
Total	600	577	638	699	805	962	1,033	1,044	1,167
Admission Rate per 100,000 Population	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	94.3	92.5	96.2	99.8	113.5	120.8	127.9	123.0	135.4
Female	54.3	46.7	52.1	58.0	67.1	81.1	83.9	87.5	90.9
Total	74.8	70.1	74.6	79.3	90.8	102.0	107.1	106.1	114.1
Hospital Days	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	1,767	2,284	1,860	1,894	1,975	2,386	2,669	2,603	2,583
Female	975	1,077	1,019	1,070	1,199	1,387	1,358	1,516	1,407
Total	2,742	3,361	2,879	2,964	3,174	3,773	4,027	4,119	3,990
Hospital Days Rate per 100,000 Population	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	430.7	543.0	426.0	421.1	435.9	479.4	526.1	505.0	483.8
Female	248.6	267.8	243.6	248.1	276.6	311.6	296.8	323.4	287.9
Total	341.7	408.5	336.7	336.5	358.0	400.2	417.4	418.5	390.2
Average Length of Stay	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	4.6	5.9	4.4	4.2	3.8	4.0	4.1	4.1	3.6
Female	4.6	5.7	4.7	4.3	4.1	3.8	3.5	3.7	3.2
Total	4.6	5.8	4.5	4.2	3.9	3.9	3.9	3.9	3.4
Deaths	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total	13	10	6	11	7	13	19	18	12
Populations	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	410,250	420,655	436,647	449,740	453,056	497,710	507,309	515,473	533,870
Female	392,221	402,169	418,329	431,213	433,488	445,129	457,489	468,841	488,644
Total	802,471	822,824	854,976	880,953	886,544	942,839	964,798	984,314	1,022,514

When viewing hospital utilization related to race and ethnicity, it is important to understand that the Arizona Department of Health Services (ADHS) Hospital Discharge Data Base (which is the source of data for this analysis) does not contain Indian Health Services data. Hospitalizations for American Indians are only counted in this analysis if they received treatment in one of the hospitals reporting to ADHS. Consequently, American Indian rates are likely to be under-reported compared to other racial and ethnic groups in the analysis presented below.

Hospitalization rates for motor vehicle-related injury for children aged 1-14 in 1999 varied by race and ethnicity as shown in Figure 7.

Table E below shows the actual number of hospital admissions for each racial/ethnic group, estimated population counts, and the rate of hospitalizations per 100,000 adolescents age 1-14. There are some hospitalizations for which the race/ethnicity could not be determined. These cases are shown as "Other/Unknown" under the number of hospitalizations with no corresponding population estimate or rate.

Figure 7. 1999 Hospital Admissions for Motor-Vehicle Related Mortality per 100,000 Adolescents Age 1-14 by Racial and Ethnic Group

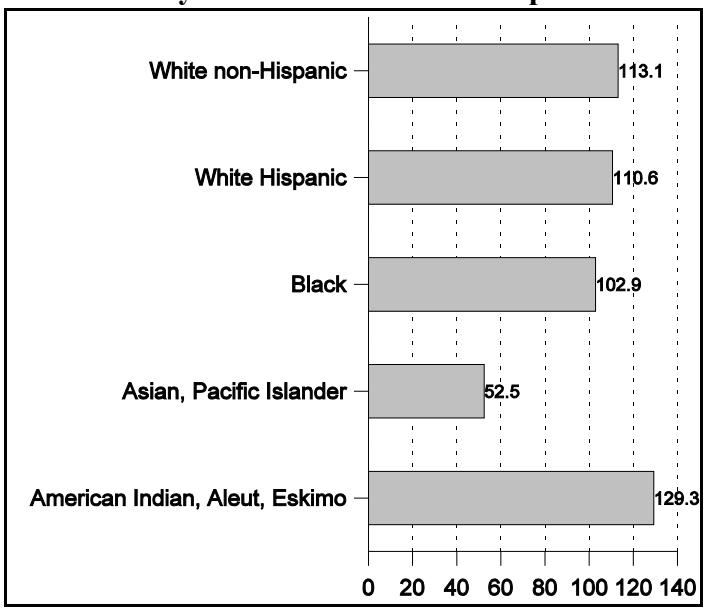


Table E. Hospital Admissions Related to Motor Vehicle Accidents per 100,000 Adolescents Age 1-14 by Racial and Ethnic Group

Racial/Ethnic Group	Number of Hospitalizations	Population	Rate per 100,000
American Indian, Aleut, Eskimo	111	85,873	129.3
Asian, Pacific Islander	12	22,839	52.5
Black	45	43,734	102.9
White, Hispanic	345	311,954	110.6
White, non-Hispanic	631	558,115	113.1
Other/Unknown	23		
Total	1,167	1,022,514	114.1

3 Motor Vehicle-Related Hospital Admissions Age 15-19

In 1999, there were 1,300 hospital admissions with a diagnosis code indicating a motor vehicle accident among adolescents, representing a rate of **382.0 admissions per 100,000** adolescents age 15-19. Fourteen adolescents died before leaving the hospital. While male hospital admission rates had been consistently higher than female rates throughout most of the 1990s, this trend has reversed in recent years (see Figure 8). Hospital stays averaged 3.6 days in 1999.

Figure 8. Hospital Admissions Related to Motor Vehicle Accidents per 100,000 Adolescents Age 15-19

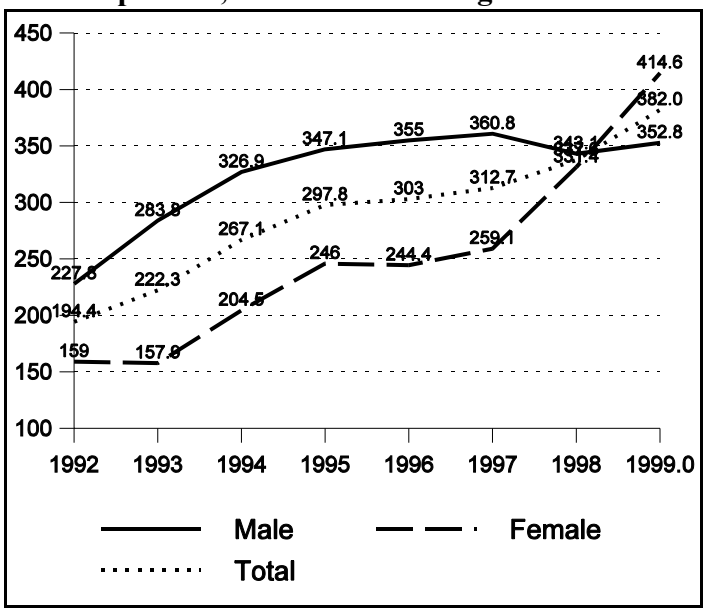
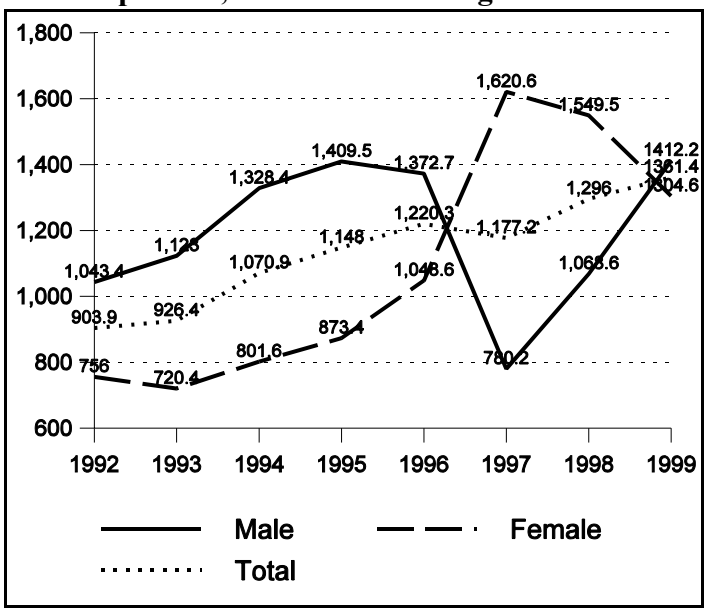


Figure 9. Hospital Days Related to Motor Vehicle Accidents per 100,000 Adolescents Age 15-19



Adolescents spent 4,633 days in the hospital in 1999 due to diagnoses related to motor vehicle accidents, representing a rate of **1,361.4 hospital days per 100,000** adolescents (see Figure 9).

Table F on the following page is a profile of hospital utilization for adolescents related to motor vehicle accidents from 1991 through 1999.

Table F. Hospitalizations Related to Motor Vehicle Accidents Age 15-19									
Admissions	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	437	322	371	438	495	579	602	593	633
Female	234	212	197	262	334	354	387	514	667
Total	671	534	568	700	829	933	989	1,107	1,300
Admission Rate per 100,000 Population	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	??	227.8	283.8	326.9	347.1	355.0	360.8	343.1	352.8
Female	??	159.0	157.9	204.5	246.0	244.4	259.1	331.4	414.6
Total	??	194.4	222.3	267.1	297.8	303.0	312.7	337.6	382.0
Hospital Days	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	2,066	1,475	1,468	1,780	2,010	2,239	1,302	1,847	2,534
Female	1,144	1,008	899	1,027	1,186	1,519	2,421	2,403	2,099
Total	3,210	2,483	2,367	2,807	3,196	3,758	3,723	4,250	4,633
Hospital Days Rate per 100,000 Population	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	??	1,043.4	1,123.0	1,328.4	1,409.5	1,372.7	780.2	1,068.6	1,412.2
Female	??	756.0	720.4	801.6	873.4	1,048.6	1,620.6	1,549.5	1,304.6
Total	??	903.9	926.4	1,070.9	1,148.0	1,220.3	1,177.2	1,296.0	1,361.4
Average Length of Stay	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	4.7	4.6	4.0	4.1	4.1	3.9	2.2	3.1	4.0
Female	4.9	4.8	4.6	3.9	3.6	4.3	6.3	4.7	3.1
Total	4.8	4.7	4.2	4.0	3.9	4.0	3.8	3.8	3.6
Deaths	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total	12	7	12	15	10	14	22	20	14
Populations	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male		141,363	130,719	133,996	142,604	163,104	166,873	172,846	179,432
Female		133,341	124,791	128,114	135,788	144,862	149,387	155,081	160,889
Total		274,704	255,510	262,110	278,392	307,966	316,260	327,927	340,321

When viewing hospital utilization related to race and ethnicity, it is important to understand that the Arizona Department of Health Services (ADHS) Hospital Discharge Data Base (which is the source of data for this analysis) does not contain Indian Health Services data. Hospitalizations for American Indians are only counted in this analysis if they received treatment in one of the hospitals reporting to ADHS. Consequently, American Indian rates are likely to be under-reported compared to other racial and ethnic groups in the analysis presented below.

Population estimates by ethnicity are not available separately for the 15-19 and 20-24 age groups. Consequently, these data are combined to compare adolescent rates of hospitalizations for motor vehicle related injuries. Hospitalization rates for adolescents age 15-24 in 1999 varied by race and ethnicity as shown in Figure 10.

Figure 10. 1999 Hospital Admissions Related to Motor Vehicle Accidents per 100,000 Adolescents Age 15-24 by Racial and Ethnic Group

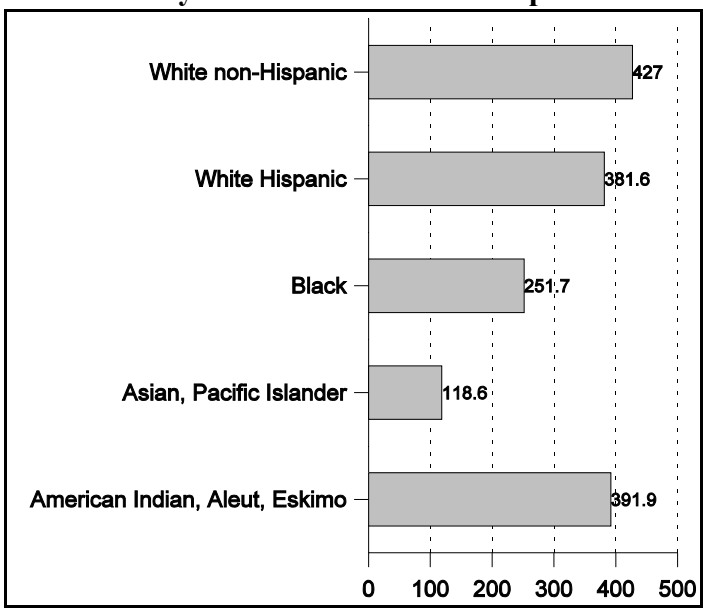


Table G below shows the actual number of hospital admissions for each racial/ethnic group, estimated population counts, and the rate of hospitalizations per 100,000 adolescents age 15-24. There are some hospitalizations for which the race/ethnicity could not be determined. These cases are shown as "Other/Unknown" under the number of hospitalizations with no corresponding population estimate or rate.

Table G. Hospital Admissions Related to Motor Vehicle Accidents per 100,000 Adolescents Age 15-24 by Racial and Ethnic Group

Racial/Ethnic Group	Number of Hospitalizations	Population	Rate per 100,000
American Indian, Aleut, Eskimo	188	47,977	391.9
Asian, Pacific Islander	19	16,020	118.6
Black	72	28,604	251.7
White, Hispanic	712	186,577	381.6
White, non-Hispanic	1,681	393,674	427.0
Other/Unknown	54		
Total	2,726	672,852	405.1

0 Motor Vehicle-Related Hospital Admissions Age 20-24

In 1999 there were 1,426 hospital admissions among young adults age 20-24, representing a rate of **428.8 admissions per 100,000** young adults. Twenty-three young adults died before being discharged from the hospital. The average length of stay for hospitalizations was 3.1 days. Until 1999 young women consistently had a lower rate of hospital admissions than men. This trend appears to have reversed in 1999 (see Figure 11).

Figure 11. Hospital Admissions Related to Motor Vehicle Accidents per 100,000 Young Adults Age 20-24

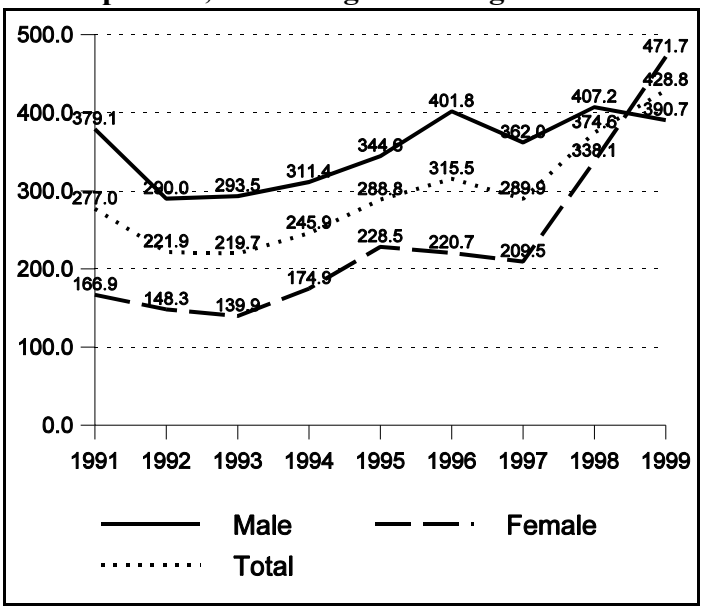
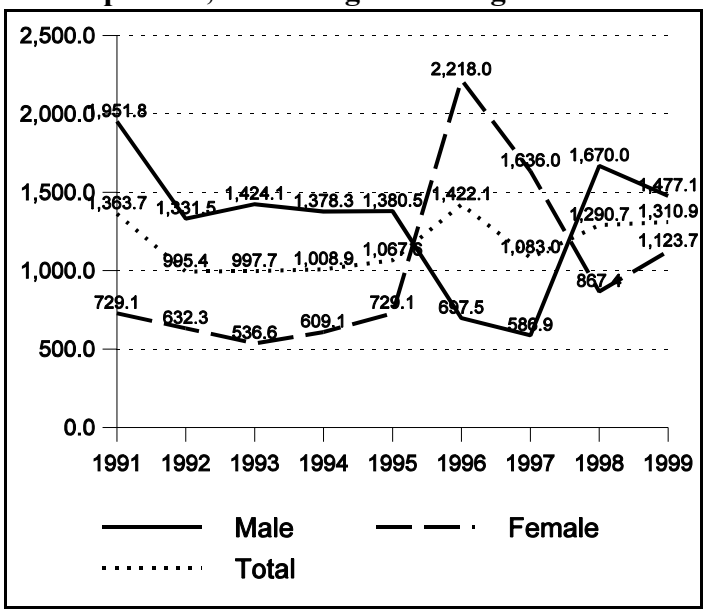


Figure 12. Hospital Days Related to Motor Vehicle Accidents per 100,000 Young Adults Age 20-24



Young adults spent a total of 4,359 days in the hospital in 1999, representing a rate of **1,310.9 days per 100,000 young adults**. Males have had a higher rate of hospital days for most years from 1991 through 1999 (see Figure 12).

Table H on the following page profiles hospital utilization statistics for young adults age 20-24 for 1991 through 1999.

Table H. Hospitalizations Related to Motor Vehicle Accidents Age 20-24									
Admissions	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	559	431	440	472	537	644	597	675	688
Female	228	204	194	245	329	322	310	502	738
Total	787	635	634	717	866	966	907	1,177	1,426
Admission Rate per 100,000 Population	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	379.1	290.0	293.5	311.4	344.6	401.8	362.0	407.2	390.7
Female	166.9	148.3	139.9	174.9	228.5	220.7	209.5	338.1	471.7
Total	277.0	221.9	219.7	245.9	288.8	315.5	289.9	374.6	428.8
Hospital Days	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	2,878	1,979	2,135	2,089	2,151	1,118	968	2,768	2,601
Female	996	870	744	853	1,050	3,236	2,421	1,288	1,758
Total	3,874	2,849	2,879	2,942	3,201	4,354	3,389	4,056	4,359
Hospital Days Rate per 100,000 Population	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	1,951.8	1,331.5	1,424.1	1,378.3	1,380.5	697.5	586.9	1,670.0	1,477.1
Female	729.1	632.3	536.6	609.1	729.1	2,218.0	1,636.0	867.4	1,123.7
Total	1,363.7	995.4	997.7	1,008.9	1,067.6	1,422.1	1,083.0	1,290.7	1,310.9
Average Length of Stay	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	5.1	4.6	4.9	4.4	4.0	1.7	1.6	4.1	3.8
Female	4.4	4.3	3.8	3.5	3.2	10.1	7.8	2.6	2.4
Total	4.9	4.5	4.5	4.1	3.7	4.5	3.7	3.4	3.1
Deaths	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Total	12	8	7	8	14	8	21	17	23
Populations	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Male	147,456	148,627	149,921	151,560	155,811	160,281	164,938	165,751	176,089
Female	136,614	137,583	138,653	140,043	144,014	145,894	147,982	148,487	156,442
Total	284,070	286,210	288,574	291,603	299,825	306,175	312,920	314,238	332,531